

Progress in Perfusion Imaging with EIT

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Abstract: There is significant interest in the use of EIT to detect and monitor the changes induced by perfusion, however, such measurement presents various technical difficulties. This talk focuses on recent progress in perfusion imaging with EIT.

Perfusion Imaging with EIT

Electrical Impedance Tomography (EIT) shows clinical promise for its ability to image air and fluid flows in the thorax. Perfusion-related changes reflect the behaviour of the cardiovascular system, and thus can convey many clinically important variables for patient management.

Since perfusion-related changes in thoracic impedance are much smaller than the impedance changes induced by ventilation, it is much more difficult to use electrical impedance tomography to extract information on stroke volume (SV), cardiac output (CO), or lung perfusion. In order to use the cardiac-related impedance information provided by EIT to quantify cardiac output and lung perfusion, several approaches have been presented in the literature, including a.) Separation of cardiac- and ventilation-related EIT signals based of frequency-domain filtering, b.) ECG gating, c.) Apnea methods, d.) Use of contrast agents and e.) Separation based on principal component analysis. After the overview, the talk will focus on recent results obtained from pig trials by using our PCA-based separation method, as soon available in [1]. One aspect here will be mixed-models analysis versus trend-monitoring.

In order to provide a background for the reader interested in further exploring the literature on perfusion imaging with EIT, we provide a selection of relevant references [2]–[17].

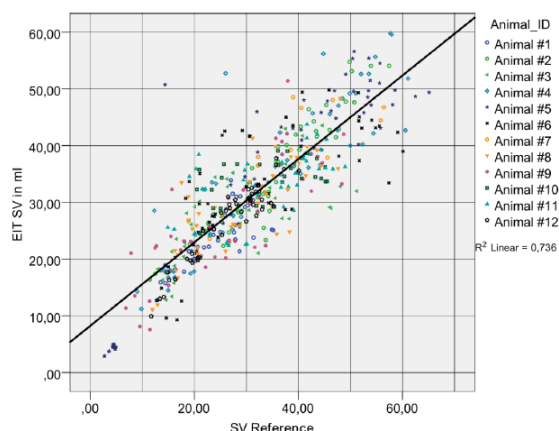


Figure 1: Overall mixed-models-correlation ($r = 0.85$, $r^2 = 0.736$) for SV estimation using PCA-separated EIT information and transthoracic thermodilution as a reference. To achieve this result, SV_EIT data had to be calibrated against SV_TTD in each single maneuver. From [1].

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